# Challenges of Deploying Unified Communications and Integrated Collaborations System in the Health Sector of Developing Countries: A case of Uganda

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***Abstract*—Access to information holds the key to the empowerment of everybody despite where they are living. This research is to be carried out in respect of the people living in developing countries, considering their plight and complex geographical, demographic, social-economic conditions surrounding the areas they live, which hinder access to information and of professionals providing services such as medical workers, which has led to high death rates and development stagnation. Research on Unified Communications and Integrated Collaborations (UCIC) system in the health sector of developing countries comes in to create a possible solution of bridging the digital canyon among the communities. The system is meant to deliver services in a seamless manner to assist health workers situated anywhere to be accessed easily and access information which will help in service delivery. The proposed UCIC provides the most immersive telepresence experience for one-to-one or many-to-many meetings. Extending to locations anywhere in the world, the transformative platform delivers Ultra-low operating costs through the use of general purpose networks and using special lenses and track systems.**

**The aim is to identify challenges anticipated in the deployment of the UCIC system in the health sector of developing countries and recommend possible solutions. These recommendations once adopted and implemented correctly will bring enhancement to the speed and quality of services offered by health workers. The capacities of UCIC will help health workers shorten decision cycles, accelerate service delivery and save lives by speeding access to information and by making it possible for all health workers and patients to collaborate everywhere.**

***Keywords*—Challenges, Developing countries, Unified communications and integrated collaborations, health services.**

## I. Introduction

The health sector of a developing country is a large organization that has always turned to technology to drive it's day to day activities. Now, more than ever, the health sector is asking Information Technology (IT) staff to do more, with less human and financial resources. This is due to the fact that the funds always allocated to the health sector are not sufficient to facilitate all the activities of the sector. The health sector is a hyper organization and needs to deliver real time services so it is looking to technology to help improve processes to increase the efficiency of the sector. The problems of effective service delivery is answered by unified communications and integrated collaborations (UCIC) system, the core competency of a UCIC solution is to address this need to do more with less and do it better than done before.

The health sector should be therefore able to deliver a robust infrastructure that caters for the following initiatives: Messaging – Email & Calendaring; Collaboration - Web Portal services[1], Intranet [2]; Unified Communication – Instant Messaging, Conferencing, Presence; System Management and Security [3-4]; Change management – Training & Process. UCIC is the integration of real-time communication services such as instant messaging (chat) [5], presence information [6], telephony (including IP based telephony) [7], video conferencing[8], data sharing (including web connected electronic whiteboards or Interactive white Boards) [9], call control [10] and speech recognition [11] with non-real-time communication services such as unified messaging (integrated voicemail, e-mail, SMS and fax). UCIC is not a single product, but a set of products that provides a consistent unified user interface and user experience across multiple devices and media types [12][13].

## II. Unified Communications And Integrated Collaboration (Ucic)

UCIC is the integration of real-time communication services such as instant messaging (chat), presence information, telephony (including IP based telephony), video conferencing, data sharing (including web connected electronic whiteboards aka IWB's or Interactive White Boards), call control and speech recognition with non-real-time communication services such as unified messaging (integrated voicemail, e-mail, SMS and fax). UCIC is therefore a set of products that provides a consistent unified user interface and user experience across multiple devices and media types [14].

UCIC allows an individual to send a message in one medium and receive the same communication on another medium. For example, one can receive a voicemail messageand choose to access it through e-mail or a cell phone. If the sender is online according to the presence information and currently accepts calls, the response can be sent immediately through text chat or video call. Otherwise, it may be sent as a




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non real-time message that can be accessed through a variety of media [15].

TelePresence is a combination of cutting edge audio, video and network enterprise solutions, also hardware optimized environments and a software glue that holds the elements together to make the best high definition video presence available in industry today [16].

It's a very new, unique, innovated technology that creates in presence, high definition, virtual meeting possible. And also TelePresence makes these things work for your work, as well as for personal life over a health sector network. The user knows predominantly it's about productivity, getting people in front of others and in a very virtual environment, but creating that in presence experience is key. Also, TelePresence is about improved responsiveness for health workers to be able to respond to patients, to be in presence of patients, also for subject matters to get in front of the patients very easily and fast. So, TelePresence enables that, also improved communication, collaboration with coworkers, partners, and patients. The aim of this research is to create an environment with seamless flow of information in the health sector by using UCIC system, thus enabling prompt medical service delivery in the health sector which will reduce the death rate in the developing countries.

## III. The Health Sector Find The Needs Evolving

National or global value chains, mobile workforces, more fast service delivery, and information overload: this is the new norm. The health sector often finds their current model and applications or systems used to support it, inadequate to meet their challenges. To address these sector activities' complexities, UCIC connects people and information seamlessly, helping to enable comprehensive and effective collaborative experiences. With UCIC the health sector can:

- Connect co-workers, doctors, nurses, patients, and support staff with the information and expertise they need.
- Access all the health sector critical communications and data from anywhere and at anytime. The office is truly where you are.
- Facilitate better and more efficient team interactions, driving workforce service delivery to simply getting things done.
- Make mobile devices true extensions of the health sector network so mobile workers can deliver services anywhere.
- Innovate the way of doing things by integrating improved collaboration and communications into Health sector processes.

## IV. Unified Collaboration System

UCIC delivers a high quality, highly secure experience across any workspace.

This helps the health sector to:

- Shorten service delivery cycles
- Reduce response times
- Encourage innovation
- Reduce lag with better real time tools
- Deliver a streamlined and better user experience
- Increase workforce agility
- Reduce support and administrative overhead
- Save money

## V. Unified Communications And Integrated Collaborations System

UCIC system has evolved along with the needs of service delivery. In a landscape that is challenging and can change so quickly, UCIC will give the health sector the flexibility to react quickly. UCIC will bring about the following benefits:

- Improve the speed and quality of decision making by leveraging a real time communications and collaboration experience
- Access relevant health sector process information over a wide range of devices, applications, and media
- Provide health sector employees and patients with immediate access to health sector experts, using presence and instant messaging
- Connect their workforce anytime and anywhere, across the country or the globe UCIC is a comprehensive solution that offers a high level of security, agility, resiliency, scalability, and quality of experience.
- Delivers real-time interactions, extended across a broad range of collaborative experiences
- Connects the right people and information, through an intelligent architecture that preserves context and enforces policies
- Provides flexible deployment options, with solutions that can be deployed on premise, hosted or in a managed services model
- Delivers incredible flexibility in licensing allowing health sector to start with what they need and expand the solution as those needs change
- UCIC is based on industry standard protocols allowing for compatibility with other systems and applications on already existing infrastructure
- Offers health sector best Total Cost of Ownership (TCO), as UCIC delivers a comprehensive unified communications and collaboration on its own.

## VI. Collaboration

Collaboration is actually a multi-layered approach to sharing information and communicating in real time. It can be broken down into several pieces, as presented in the following paragraphs, but all of these should be part of a successful collaboration solution. A collaboration solution will allow users to get access to company files from anywhere, easily, over a number of available access points including the web, client application or your mobile device. Others organizations define collaboration as a better way to share and manage their company's time through the use of calendar, contacts, and task management. A key piece to this is the ability to create shared and public or group resources, allowing for departmental resources, global resources and even custom defined groups with defined members within the user base. The ability to share personal


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data between the users is also a key component to help drive productivity by empowering the users and giving the tools that do not involve administrative interaction. Organizations looking to deploy a collaboration solution for these reasons can take advantage of powerful event and resource management for things like conference or meeting rooms, using available tools like Free/Busy lookups and simply invitation management. Still yet other organizations identify their needs for collaboration to have the ability to use real time communication tools like voice and video calls, instant messaging and text (SMS) messaging. These types of real time communication, combined with multi-location presence capabilities, give the user workforce the ability to quickly define and utilize the best method of communication to use, saving time and making their correspondence more efficient. These real time tools also greatly reduce lag in organizations' communications showing companies widespread productivity benefits. Most Unified Communications (UC) solutions deliver some level of collaboration as defined above, but UCIC system delivers them all, in one fully integrated solution, and unifies the use of them all for users in a single interface.

## VII. Communications Through All Different Health Sector Locations

The health sector finds they have outgrown their current method of communicating; this is especially true because it has multiple locations around a country or even around globe in many cases. The health sector is typically medium to large organization that has complex communications needs, including a large mobile workforce; this only compounds the ability to stay connected.

The health sector can benefit the greatest from a UCIC solution due to the huge efficiency increases that it can realize by streamlining the way they communicate. The health sector has to adopt a UCIC solution which brings in many enhancements to how their users work, extending their current tools and giving them new ones as well. Email, which is one of the core communication methods organizations rely on, is brought to new levels by creating fully synchronized environments where users can get their mail anywhere. The presence, instant messaging and voice capabilities provide a rich meeting experience for coworkers in different locations just as if they were face to face.

## VIII.Mobility

There is an ever growing need in health sector today. More and more, the health sector is deploying staff in the rural health centres and the field medical work and to monitor epidemics that occur from time to time, and technical support, or to work on projects on site. Only recently there was still a large disconnect when these users were out there in rural health centres and the field. At best they could get their email but possibly not in real time. This leads to a gap in real time information and can lead to loss of lives or a patient service experience that might not be otherwise satisfactory. With a UCIC solution, the health workers' office is where they are. The health sector needs to deliver an experience to the mobile worker that emulates what they can do in the office, providing full access to all of their communications, calendars, contacts, tasks and their current status through presence. This mobile access is not only available on a mobile device such as an iPhone, Blackberry, or Android, but on a wide range of client applications or the feature rich UCIC system Client, this gives the user the option to use what medium is best and/or available for them. Studies show that untethering the workforce can lead to huge savings on time, money and increases moral among the user base.

## IX. User Friendly Experience

It is often the users that drive the innovation and use any system tools in an organization. As the health sector expands the way they do there processes, they find themselves needing to provide their users new tools, they find that their current method and the tools that support it, are cumbersome and difficult to use involving several different interfaces that have no interoperability. They are seeking a completely unified and streamlined experience where users can access all of their tools in one location, giving them a virtual office wherever they are. This streamlining is one of the biggest core competencies to a UCIC solution, from both the IT management stand point and down through the end user experience. And its resulting delivery boost brings on better time management and improved efficiency is one of the biggest core benefits.

## X. Low Cost

The health sector wants to save money. The nations are in the time of shrinking budgets and because of this; the health sector is looking at consolidation in their IT infrastructure, to accomplish this. UCIC fits this ideally, while still delivering a more robust feature set for the organization to leverage savings which are seen on many fronts. Overall cost of software and especially hardware are reduced as you go from a multi-system to a single system environment. Overhead of system administrators is reduced freeing them up for other projects or other possible revenue generating opportunities. Overhead from an accounting stand point is reduced by now only having to deal with one vendor for invoices and licensing, plus renewals are once a year as opposed to different times throughout. Lastly, the overall increases in efficiency that lead to better service delivery are a direct impact on the bottom line as the cost per employee goes down.

Really all of the reasons above are valid for nearly every organization, but just on varying levels. There are many bottlenecks in most institutions' communications and most of them lack a true way to collaborate. Unified communications is still a model being adopted slowly but more and more organizations are looking at a UCIC solution. A recent report by Gartner Research estimates that only about 5% of businesses currently have a unified communications solution deployed but that number is expected to jump to as





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much as 30% by 2012 with an estimated 45% of businesses considering adopting a unified communications solution.

## XI. Unified Communication Challenges

There are many factors to be considered when evaluating the deployment of a UCIC solution. Beyond measuring the potential benefits we have explored health sector also need to look at the challenges they will face in their planned deployment. By undergoing a thorough readiness assessment and weighing out all factors the organization can determine if a UCIC solution is right for them. In the following subsections, some of the most common challenges for organizations and reasons behind them are outlined.

### *A. Technical Challenges*

• *The existing IT infrastructure – i)* Connectivity – the existing connectivity like fiber optic networks do not reach some rural locations where facilities exist. The wireless broadband, Wi-Fi and WiMax hot spots are few and mostly located in the urban areas. Connectivity is the transportation of the IT signals of the health sector which becomes difficult for remote access. ii) Hardware and software – different hardware and software are being used within the same health sector. This situation brings about the issues of interoperability, remote access, mobility, and maintenance difficulties. iii) The scenario of the telephony and the data/ video networks operating as separate entities. iv) some health facilities have very old or no IT infrastructure in place.

• *Learning curve of IT staff* – Ultimately, any new solution requires IT staff to learn how to manage, and support it. The learning curve for this is dependent on many factors, including knowledge and number of available staff, and the available training resources from the solution vendor.

• *Ongoing support concerns* – Post deployment and as the IT staff develop their support methodology around the new UCIC solution, what difficulties or new support challenges will this create. This is directly tied to both administrators and end users learning curves.

• *Systems technical complexity* – Faced with deploying and supporting technologies that they may have not had any prior experience with, the complexity of the system, and especially the administrative interface or toolset is a key challenge to consider.

• *Integration with existing infrastructure* – How much of the existing infrastructure can the new UC solution leverage or will they need to do a complete rip and replace.

• *Active Directory and Global Applications* - the ability to deploy global applications is hampered due to the existence of multiple Active Directory Footprints that has resulted to a lack of common Security Group policies (GPOs) and authoritative health sector Identity source,

• *Messaging and Collaboration* - as initiatives seek cross-group collaboration, excessive time and energy is spent bridging the many independent departments making it costly for the health sector to execute on even the most basic collaborative services

### *B. Social Challenges*

The social challenges are grouped into two major categories namely end user and management.

*(i) End user challenges*

• *User learning curve* – Even more than administrators, end user learning curve needs to be considered because these individuals are typically less technical savvy than IT staff. How organizations can reduce this curve is of the utmost importance.

• *User attitude/buy in* – Users can be very resistant to change. They like the way they do things now and often do not show a willingness to learn how to use new tools, even if they will benefit from them directly.

• *Employee and Business Productivity/Performance*– a key requirement by the health sector is user productivity/ performance.

*(ii) Management Challenges*

• Management attitude/buy in – Management will always need to be onboard for deploying a new solution, especially when it is so mission critical as their communications. Without management buy in, deploying a UC solution simply cannot happen.

• *Operational Complexity* - the costs of administering and maintaining multiple infrastructures is significantly increased for the Health Sector

• *Business continuity* – In ideal situation, the new solution should disrupt the normal flow of business. How can the new solution be introduced and yet should not disrupt business continuity.

• *Management Agility* – growth and restructuring are part of normal operations for the health sector.

### *C. ICT in health Policy challenges*

• *Policy existence* – in many developing countries there are no ICT in health policies present. This situation makes it difficult to implement and utilize ICTs in the health sector.

• *Development of policy* – the development of the ICT in health policy is most of the time the dialogue who should develop it. Is it the medical doctors or the ICT personnel?

• *Implementations of the policy* – where the policies were present the implementations of the policies were not properly carried out.

### *D. Security and privacy challenge*

*Security* -mobile employees roam around the world with their PCs, using these PCs in hotel rooms, home, internet cafes etc and in the process could get the PCs infected.

*Privacy*- there is always a fear that considering the complexity, size and the categories of the information being implemented in the UCIC system is not secure and that there is no privacy.

### *E. Economic challenges*

• *Cost for deployment* – Although the long term and even short-term savings are easily documented and can be substantial, the upfront cost can sometimes be a prohibitive factor in deploying a UC solution.


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• *Cost benefit analysis* – there is school of thought that says training many doctors would avert the problems of service delivery in the health sector than would UCIC because the initial cost of deploying it are big. However, as much as this would be true the cost of remuneration of the medical personnel in the developing countries does not compel them to stay in the developing countries but pushes them to move to look for greener pastures in the developed countries. Consequently, the governments of developing countries are spending money to train the personnel but are unable to keep them in the job. This causes loss of fund on training which does not benefit the country.

*F. Political challenges*

Political will – ICT occupies poorly defined loci in the public policy process of the developing countries. While the continent of Africa is still grappling with the most basic requirements of life such as food, water, education, and shelter the developed world is fast leading towards a globally networked information economy and society. Less than 35% of Africa's population has access to basic health or medical care facilities. The question is whether it is fair then for Africa to go global on ICT without first having addressed the basic needs of it's people?

## XII. Mitigating Ucic Challenges

While all the challenges listed are valid for any UCIC deployment, they all can be addressed. A thorough needs assessment and subsequent plan can mitigate these challenges or risks. This section presents examination of some ways the health sector can mitigate these challenges.

*A.Technical Challenges*

• *The existing IT infrastructure* – i) Connectivity – boasting the already existing fiber optic network backbone with many hot spots of WiMax and wireless broadband to the remote rural areas to enable the possibility of remote access. ii) Standardizing the hardware and software to avert the problems of interoperability, mobility, portability and maintenance difficulties. iii) Integrating the telephony and data/video networks. iv) Ripping out the equipment that do not meet the new current technology standards and replacing with new ones and equipping the health facilities that do not even have anything with the infrastructure to enable them join in the harvest of the benefits provided by the UCIC and this can reduce the death rates considerably

• *Learning curve of IT staff* – Involvement from the very beginning of the evaluation by any involved IT staff is a key to cutting down this learning curve. Vendor specific training is also a key factor and this should be part of any potential proposal to ensure that IT staff acquire the knowledge they need to take advantage of what the UCIC solution can provide.

• *Ongoing support concerns* – This goes hand in hand with the learning curve. Proper training will greatly reduce ongoing support concerns. Also, consider a support level agreement with the vendor or certified partner, at least for year one. This will allow the health sector to extend support capabilities with the vendor's support staff and give the IT staff opportunity to work hands on with them to learn the proper support protocols.

• *Systems technical complexity* – The new system will have levels of complexity that IT staff may have not encountered before. This can be true and the challenge can be mitigated with the UCIC system due to the logical and intuitive administration interface.

• *Integration with existing infrastructure* – UCIC is based on support for standard communication protocols, offering a wide range of support for various clients and applications natively. Also, the extensive Application Programme Interface (API) allows for integration possibilities that are nearly unmatched by any other system.

• *Active Directory and Global Applications* - the ability to deploy global applications will be effectively done due to the system with single Active Directory Footprints which will result in common Security Group policies (GPOs) and authoritative health sector Identity source.

• *Messaging and Collaboration* - as initiatives seek cross-group collaboration, less time and energy will be spent bridging the many independent departments making it cost effective for the health sector to execute on even the most basic and critical collaborative services

*B. Soial Challenges*

*i)End User Challenges*

• *User learning curve* – Training initiatives are the key and the only way to truly mitigate this. Knowledge transfer to the IT staff with available vendor resources is critical so they can structure and provide user training.

• *User buy in* – Get a subset of the user base to buy in by forming them into a test group. If it can be demonstrated to this set of users the benefits and ease of use, they can in turn help champion the cause for the organization amongst the user base at large.

• *Employee and Business Productivity/Performance* – a key requirement by the health sector is user productivity/ performance so the UCIC will increase the productivity

ii)Management Challenges

• Management buy in – As IT is often leading the charge for the push towards a UCIC solution, management buy in can be hard to gain sometimes. The use of a test group is also the best way to work through this, and if possible, include some members of management in this test group so they can see the benefits first hand from the usability front. Also, there is a need to clearly define the business problems and the solution that the UC system will provide to them.

• *Business continuity* – The new UCIC solution will most likely be able to completely replace the way you do of doing things and the new systems used. This is the goal after all. This will lead to a change in business processes but to start with, current processes should be improved upon as opposed to being replaced. This will help maintain business continuity. Also, a clear migration strategy and plan to move to the new solution must be in place and presented to management and users at large.





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• *Operational Complexity* - the costs of administering and maintaining multiple infrastructures will significantly be decreased for the Health Sector

• *Management Agility* –the IT infrastructure needs to handle these events as a natural part of the IT ecosystem instead of as a major exception to the IT operations [17].

*C. ICT in health Policy challenges*

• *Policy existence* – developing countries should embark on creation of ICT in health policies because this will enable proper implementation and utilization of the UCIC system.

• *Development of policy* – the development of the ICT in health policy should be done by both medical workers and ICT personnel.

• *Implementation of the policy* – the enforcement of the policies must be a very clear process for the success of any ICT system.

*Security and privacy challenge*

*Security* -mobile employees roam around the world with their PCs, using these PCs in hotel rooms, home, internet cafes etc and in the process could get the PCs will be protected in single system arrangement.

The fear that has always is existing that the system is complex big in size should be removed from any one ones mind because the system is built on the already existing system that is compatible. The UCIC system is built with security and privacy mechanism already in place.

*D. Economic challenges*

• *Cost for deployment* – Many organizations see the upfront cost as a big obstacle for deploying a UCIC solution, even when outweighed by the long-term savings, as they simply do not have the budget. This is a problem that UCIC system addresses uniquely by offering the lowest. Not only is the software licensing model more flexible and less expensive, but the lightweight design and resource practicality usage means that you save money on other aspects of the solution such as hardware. Also, as you can take advantage of existing infrastructure, this saves both deployment time and money.

• *Cost benefit analysis* – as much as the training of many doctors should continue they will always never be the enough for the task ahead since the population is increasing at very fast rate. So the doctors need to be boosted with technology to enhance them perform much better than they would without technology support. This would also encourage them to stay in their countries since they will be working in a relaxed atmosphere with the remunerations aspect also being attended to. This would mean that a few medical staff can handle more patients at ago thus, savings would be made and this will motivate them stay working in their countries of origin and training.

*E. Political Challenges*

Political will – ICT should be positioned in the priority loci in the public policy process. There should be a rigorous sensitization of the benefits of ICT's or systems like UCIC exercise for highly influential decision makers to make them understand the change the ICT systems bring to the economy and easy in service delivery. African countries should be made to understand that services delivery in education, health and food delivery can be made faster with ICT's in place.

## XIII. Unified Communications Deployments – Some Surprising Results

A recent study by Osterman Research showed some surprising results that really strengthen the case for a UC deployment. These results were taken from a poll of 185 small and medium enterprise customers that completed a UC deployment. Let's take a look at some of these results.

*A. Planners underestimated the benefits of deploying a UC solution*

On average, implementers rated realized benefits 28% higher than planners rated anticipated benefits of their UC deployment. Implementers rated every benefit higher than planners did.

Increased revenue was rated 69% higher by organizations that have completed a UC deployment than those in the planning stages. The benefit with the smallest gap between planners and implementers was increased employee productivity. However, implementers still rated it 13% higher than planners.

*B. Planners overestimated the challenges of deploying a UC solution*

On average, implementers rated encountered challenges 7% lower than planners rated anticipated challenges of UC. Integration with infrastructure was rated 16% higher by organizations in the planning stage than those who have completed an implementation. Technical complexity was rated 2% higher by organizations that have completed a UC deployment, indicating that UC is a slightly more complex technology than most expect.

## XIV. Conclusions

Many benefits and challenges in the deployment of UCIC solution have been identified, along with some steps that can be taken towards mitigating these challenges. The benefits of UCIC are better and easier to use tools to communicate and collaborate, better and more immediate access to organization data, improved service delivery amongst the workforce, streamlined and consolidated management and end users experience and reduced cost.

The alleviation factors are needed for improved collaboration and better real time communications tools, need to support a growing mobile workforce, need to communicate with colleagues and coworkers across the country or the globe, need to reduce IT spending, and need for good service delivery in the health sector to avert the death rates happening in the developing countries


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